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ABSTRACT

This manual is intended to provide students, teachers, counselors, and other school personnel with a set of practical instruments and procedures designed to measure the generalizable mathematics skills of students in secondary vocational programs. Three types of assessment instruments and procedures are presented and discussed: (1) student self-ratings, (2) teacher ratings, and (3) performance tests. The manual is organized around five major sections. The first section describes the list of generalizable mathematics skill areas and skills. The second, third, and fourth sections describe the student self-rating instrument, teacher rating instrument, and performance test, respectively. These three sections provide information regarding the assessment procedures, including instrument development, item analysis, reliability, validity, administration, scoring, and uses. The fifth section describes how the student self-ratings and teacher ratings can be used in combination with the performance test assessment instrument and how the scores may be used and interpreted. The appendixes present the list of generalizable skills color charts; additional important mathematics skills; the student self-rating, teacher rating, and performance test instruments; skill profiles; and the performance test answer key. The information contained in this manual and the information obtained from the assessments can be used in individualized and group planning, assessment, curriculum development, instruction, and evaluation activities. (KC)

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**Generalizable Mathematics Skills Assessment
User Manual**

**Illinois
State Board of
Education**

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Adult, Vocational
and Technical
Education**

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Table of Contents

	Page
Purpose of the User Manual	1
Generalizable Mathematics Skills	3
Student Self-Ratings	5
Instrument Development	5
Reliability	6
Internal Consistency Reliability	6
Test-Retest Reliability	7
Validity	7
Construct Validity	8
Administration	9
Scoring	10
Individual Skills	10
Scales and Total Instrument	11
Uses	12
Teacher Ratings	15
Instrument Development	15
Reliability	15
Internal Consistency Reliability	15
Test-Retest Reliability	16
Validity	17
Construct Validity	17
Administration	18
Scoring	18
Individual Skills	18
Scales and Total Instrument	19
Uses	20

	Page
Performance Test	23
Instrument Development	23
Item Analysis	24
Reliability	25
Internal Consistency Reliability	25
Test-Retest Reliability	26
Validity	26
Construct Validity	26
Administration	27
Scoring	27
Individual Skills	27
Scales and Total Instrument	28
Uses	29
Use of the Student Self-Ratings and Teacher Ratings with the Performance Test Assessment Instrument	31
Individual Skills	37
Scales	38
Total Instrument	40
Appendices	43
Appendix A: Generalizable Mathematics Skills	45
Appendix B: Additional Important Mathematics Skills	47
Appendix C: Student Self-Ratings	49
Appendix D: Teacher Ratings	51
Appendix E: Performance Test	53
Appendix F: Performance Test Answer Key	55
Appendix G: Assessment of Untested Skills	57

Purpose of the User Manual

The major purpose of the User Manual is to provide students, teachers, counselors, and other school personnel with a set of practical instruments and procedures designed to measure the generalizable mathematics skills of students in secondary, vocational programs. Three types of assessment instruments and procedures were developed, and are presented and discussed: (a) Student Self-Ratings, (b) Teacher Ratings, and (c) Performance Test.

The User Manual is organized around five major sections: The first section describes the list of generalizable mathematics skill areas and skills. The second, third, and fourth sections describe the Student Self-Ratings Instrument, Teacher Ratings Instrument, and Performance Test, respectively. These three sections provide information regarding the assessment procedures that include: (a) instrument development, (b) item analysis, (c) reliability, (d) validity, (e) administration, (f) scoring, and (g) uses. The fifth section describes how the Student Self-Ratings and Teacher Ratings can be used in combination with the Performance Test assessment instrument and how the scores may be used and interpreted. Further, the appendices present the list of generalizable skills color charts, additional important mathematics skills, Student Self-Ratings, Teacher Ratings, Performance Test, Skill Profiles, and Performance Test Answer Key.

The generalizable mathematics skills assessment instruments, strategies, and procedures may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing vocational programs. After identifying students' mathematics skill levels, teachers will have a basis on which to present and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen programs. The assessment instruments are not intended as screening devices for

admission or exclusion purposes, but are intended for diagnostic and prescriptive purposes. The information contained in the User Manual and the information obtained from the assessments can be used in individualized and group planning, assessment, curriculum development, instruction, and evaluation activities.

Generalizable Mathematics Skills

The generalizable mathematics skills identified and validated in the secondary vocational programs and occupations in the State of Illinois were used as a basis for developing the assessment strategies and procedures contained in this User Manual. A generalizable mathematics skill is a skill which is basic to, necessary for success in, and transferable (or common) within and/or across vocational programs. The entire report or executive summary describing the skills may be obtained from the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education and is entitled, "Identification of Generalizable Skills in Secondary Vocational Programs."

The mathematics skills identified as generalizable within and across agricultural; business, marketing, and management; health; home economics; and industrial occupations programs are illustrated in the color charts contained in Appendix A. Five categories of generalizable mathematics skills were identified and include: (a) Whole Numbers (5 skills), (b) Fractions (4 skills), (c) Decimals (6 skills), (d) Percent (2 skills), (e) Mixed Operations (4 skills), (f) Measurement and Calculation (6 skills), and (g) Estimation (1 skill).

In addition, several mathematics skills (See Appendix B) were identified as important but not necessarily generalizable in various individual vocational programs. Some of these skills (e.g., algebra, geometry, trigonometry) are the "higher order" mathematics skills. While similar skills may not be generalizable across vocational programs, they are frequently important for success in various programs and occupations. Further, proficiency and mastery in the generalizable mathematics skills are usually prerequisite to acquisition of the "higher order" mathematics skills. The focus of this User

Manual, therefore, is on strategies and procedures for assessing generalizable mathematics skills in secondary vocational programs.

Student Self-Ratings

Instrument Development

The purpose of the generalizable mathematics skills Student Self-Ratings assessment instrument (See Appendix C) is to assess how well students can perceive or estimate their own generalizable mathematics skills. The generalizable mathematics skills listed in Appendix A were used as a basis for systematically developing the Student Self-Ratings assessment instrument. The skills were identified through a combination of literature reviews, curriculum analysis, employer/worker reviews and surveys, teacher reviews and surveys, and other data sources.

Each of the generalizable mathematics skills was translated into 7 scales and 28 instrument items and includes: (a) Whole Numbers Scale (5 items), (b) Fractions Scale (4 items), (c) Decimals Scale (6 items), (d) Percent Scale (2 items), (e) Mixed Operations Scale (4 items), (f) Measurement and Calculation Scale (6 items), and (g) Estimation Scale (1 item). Several items in the Student Self-Ratings contain examples to clarify the skills. A four-point Likert scale based on "degree of skill" is used to measure each skill and includes: (a) "1" Cannot Do, (b) "2" Cannot Do Too Well, (c) "3" Can Do Fairly Well, and (d) "4" Can Do Well. Directions and an example are provided to assist students in using the instrument.

Several drafts of the Student Self-Ratings were developed and reviewed by a panel of experts which included teachers, students, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing subsequent revisions of the Student Self-Ratings. The instrument was also pilot tested on a random sample of students in selected secondary vocational programs. Based on the collective feedback from the panel of experts and information/

data collected from the pilot testing, the final version of the Generalizable Mathematics Skills Student Self-Ratings Assessment instrument was produced. The Student Self-Ratings was then considered to possess a sufficient degree of content and face validity. Extensive field testing was conducted to estimate the reliability and further validate the Student Self-Ratings.

Reliability

Reliability is concerned with the extent to which a measuring instrument is capable of producing measures that are internally consistent, precise, and stable. The reliability of the Student Self-Ratings was estimated by internal consistency reliability and test-retest reliability.

Internal Consistency Reliability

The internal consistency reliability of the total Student Self-Ratings instrument is .96 (Cronbach's Coefficient Alpha). This value indicates that the instrument is highly internally consistent and is measuring a uniform or single construct of generalizable mathematics skills. For fifteen vocational programs (Conservation; Agricultural Mechanics; Horticulture; Secretarial; Data Processing; Computer Programming; Nurse Aide; Practical Nursing; Health Occupations Cooperative Education; Food Service, Production, and Management; Child Care; Child Development; Construction and Building Trades; Electronics; Machinist) the reliability coefficients range from .85 to .98. The coefficient for males is .94 and for females is .97. The Student Self-Ratings are also highly internally consistent for students with different levels of mathematics aptitude as measured by the Generalizable Mathematics Skills Performance Test (high: .94, medium: .96, low: .98). In addition, the individual and total coefficients are generally in the high .80 to .95 range. The data indicate that the Generalizable Mathematics Skills Student

Self-Ratings Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Student Self-Ratings instrument is .81 (Pearson Product-Moment Correlation Coefficient (r)). This correlation indicates that the Student Self-Ratings instrument re-administered over time (14 days) to the same students produces similar results, and is, therefore capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .70 to .99. The coefficients for males is .72 and for females is .88. The Student Self-Ratings are also stable for students with different levels of mathematics aptitude (high: .86, average: .67, low: .97). In addition, the individual and total scale coefficients are generally in the .67 to .99 range. Most of the correlations are significant at the $p < .05$., $p < .01$., and/or $p < .001$. level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Student Self-Ratings Assessment instrument possesses an acceptable level of test-retest reliability and is a moderate to high stable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Validity

Validity is concerned with the extent to which an instrument actually measures what it intends to measure. Evidence of validity is frequently obtained through content analysis and judgments by instrument users as was described in the instrument development section. Validity information about a measuring instrument may also be obtained through comparisons with other

similar tests or criterion measures, analysis of particular psychological traits, or other procedures. In addition to content and face validity, the Student Self-Ratings instrument was examined regarding evidence of construct validity.

Construct Validity

The construct validity of a measurement instrument is generally concerned with determining what psychological trait(s) the instrument is actually measuring. If the Student Self-Ratings have evidence of construct validity, they should produce results which agree or are consistent with the Performance Test for different vocational programs, males and females, and students who have high, average, and low levels of mathematics aptitude.

The correlation (r) between the total Generalizable Mathematics Skills Student Self-Ratings and Performance Test is .40. This coefficient indicates that there is a moderate relationship or agreement between the Student Self-Ratings and Performance Test. The correlations between the Student Self-Ratings and Performance Test for 15 vocational programs range from -.24 to .67. The coefficients for males is .20 and for females is .49. The correlations for students with different levels of mathematics aptitude are: (a) high: .40, (b) average: .15, and (c) low: -.17. In addition, the individual and total scale coefficients are generally in the .17 to .72 range, although most coefficients are below .60. Several of the correlations were significant at the $p < .05$, $p < .01$, and/or $p < .001$ level of significance.

While the Student Self-Ratings are highly reliable measures in terms of internal consistency and stability, they have a low to moderate relationship or agreement with the Performance Test. The data suggest that the Student Self-Ratings are probably detecting student characteristics or variables other than vocational programs, gender, or level of mathematics aptitude. For

example, the Student Self-Ratings may reflect, in some cases, students' self-esteem or self-image. Therefore, some students may be underestimating their skills while other students may be overestimating their skills relative to their scores on the Performance Test. The Student Self-Ratings may also be detecting other similar psychological variables. Therefore, when using the Student Self-Ratings, school personnel should be aware that an individual student's ratings may be somewhat higher or lower than his/her actual score on the Performance Test.

Administration

A brief explanation by the teacher or other appropriate school personnel as to the purpose of the Student Self-Ratings assessment instrument, may help the student to maintain interest and motivation for completing the Ratings. The Ratings may be administered to individual students or to a group of students.

Each student is provided a Student Self-Ratings instrument that includes directions and an example for completing the Ratings. On the first page of the Ratings, the student should write his/her name, write his/her teacher's name, write the name of his/her school, check (☒) his/her vocational program area, and write the name of his/her vocational program. Students are then directed to "Indicate, by circling the number, how well you believe you can do each of the following mathematics skills." It is important that students understand they are only to rate how well they believe they can do each of the skills, and not to actually "perform" the skills. At the end of the Ratings, in the spaces provided, students may also write comments about their mathematics skills.

Students should be permitted as much time as is necessary to complete the Student Self-Ratings. The administrator (e.g., teacher, counselor) of

the Ratings may decide to stop the assessment at a logical point (e.g., at the end of a scale) and continue at a later time. Students should understand that the results of the Student Self-Ratings instrument will not affect their admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Student Self-Ratings instrument may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the ratings are interpreted for each individual skill, each descriptor (i.e., "Cannot Do," "Cannot Do Too Well," "Can Do Fairly Well," "Can Do Well") may describe a student's self-reported skill level. For example, a rating of "4" or "Can Do Well" on a specific skill, may indicate a high level of skill proficiency--assuming no overestimation--(see pages 31 and 32) for an individual student; thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a rating of "1" or "Cannot Do" may likely suggest that a low skill level exists--assuming no underestimation--(see page 32) and that learning prescriptions including remedial or support services are probably needed for an individual student.

A rating of "2" or "Cannot Do Too Well" may indicate that perhaps some (i.e., average) skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases, the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. A rating of "3" or "Can Do Fairly Well" (i.e., average skill proficiency) most

likely indicates that in many situations a student can perform a skill but may have difficulty at times during different stages of making calculations and problem solving. Similarly, a learning prescription should focus on those areas causing some difficulty for students. Scoring and interpreting individual skills probably is most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Student Self-Ratings may also be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained and may include: (a) 1-1.99 average rating; low skill proficiency, (b) 2.00-2.99 average rating; average skill proficiency, and (c) 3.00-4.00 average rating; high skill proficiency. For example, a 3.5 average skill rating on a scale (e.g., whole numbers scale, skills 1-5) or the total instrument (all 7 scales and 28 skills) may indicate a moderately high self-report of skill proficiency. Minimal, if any, additional instructional or support services may be needed for an individual student to attain the mathematics skills required for success in his/her vocational program. An average skill rating of 1.5, however, probably would suggest that additional instruction, remedial, and/or support services are necessary for assisting a student to attain the required skill levels.

It should also be noted again that an individual student's Self-Ratings on specific skills and scales, or the total instrument, may be somewhat overestimated or underestimated relative to his/her score on the Generalizable Mathematics Skills Performance Test. However, as students use the Student Self-Ratings more frequently, they should become increasingly familiar with the mathematics skills requirements of their vocational programs. In addition,

using the Student Self-Ratings should allow students to become more knowledgeable about their learning strengths and functional learning problems, and become self-directed in the assessment and learning process. Further, for students who underestimate or overestimate their generalizable mathematics skills, use of the Student Self-Ratings should assist their self-reports to become consistent with their actual performance (scores).

The teacher may use the "Skill Profile" provided with the Student Self-Ratings instrument (see Appendix C). The Ratings may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Student Self-Ratings instrument, as stated previously, has potential for allowing students to become more familiar with the mathematics skills requirements of their programs and become more cognizant of their learning strengths and functional learning problems. The Ratings could also assist students to become more self-directed in the learning and decision-making processes. The Student Self-Ratings could, therefore, be useful throughout a student's vocational course or program.

The Student Self-Ratings could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school personnel should plan for and use the Self-Ratings as frequently as necessary, based on individual student needs.

The information and interpretation of the Ratings should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Student Self-Ratings assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Student Self-Ratings, Teacher Ratings, and Performance Test for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills, provides unique input about student skill proficiencies by using different strategies.

In summary, the Student Self-Ratings have several uses which may include:

- Creating an awareness in the student of the mathematics skills requirements of his/her vocational program.
- Permitting the student to become actively involved in the assessment process.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Assisting the student in becoming self-directed in the learning and decision-making processes.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.

- Providing information useful for developing individualized vocational/ career programs.

Teacher Ratings

Instrument Development

The purpose of the Generalizable Mathematics Skills Teacher Ratings Assessment instrument (See Appendix D) is to assess how well teachers can perceive or estimate their students' generalizable mathematics skills. The same scales, skills, items, and procedures used to develop the Student Self-Ratings instrument were used to develop the Teacher Ratings instrument. The format and content of the Teacher Ratings were identical to the Student Self-Ratings, except for the directions which were directed toward teachers.

Several drafts of the Teacher Ratings were developed and reviewed by a panel of experts which included teachers, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing the revisions of the Teacher Ratings instrument. The instrument was also pilot tested on a random sample of teachers in selected secondary vocational programs. Based on the collective feedback from the panel of experts and information/data from the pilot testing, the final version of the Generalizable Mathematics Skills Teacher Ratings was produced. The Teacher Ratings was then considered to possess a sufficient degree of content and face validity. Extensive field testing was conducted to estimate the reliability and further validate the Teacher Ratings.

Reliability

Internal Consistency Reliability

The internal consistency reliability of the total Teacher Ratings instrument is .99 (Cronbach's Coefficient Alpha). This value indicates that the instrument is high internally consistent and is measuring a uniform or single

construct of generalizable mathematics skills. For 15 vocational programs the reliability coefficients range from .97 to 1.00. The coefficients for males and for females is .99. The Teacher Ratings are also highly internally consistent for students with different levels of mathematics aptitude as measured by the Generalizable Mathematics Skills Performance Test (high: .98, average: .98, low: .99). In addition, the individual and total coefficients were generally in the .90 to 1.00 range. The data indicate that the Generalizable Mathematics Skills Teacher Ratings Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Teacher Ratings instrument is $r = .83$. This correlation indicates that the Teacher Ratings Instrument re-administered over time (14 days) to the same teachers is capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .44 to .99. The coefficients for males is .86 and for females is .80. The Teacher Ratings are also stable for students with different levels of mathematics aptitude (high: .83, average: .76, low: .88). In addition, the individual and total scale coefficients are generally in the .50 to 1.00 range. Most of the correlations are significant at the $p < .05$, $p < .01$, and or $p < .001$ level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Teacher Ratings Assessment instrument generally possesses an acceptable level of test-retest reliability and is a moderate to high stable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Validity

Construct Validity

The correlation (r) between the total Generalizable Mathematics Skills Teacher Ratings and the Performance Test is .53. This coefficient indicates that there is a moderate relationship or agreement between the Teacher Ratings and Performance Test. The correlations between the Teacher Ratings and Performance Test for 15 vocational programs range from -.21 to .78. The coefficients for males is .46 and for females is .57. The correlations for students with different levels of mathematics aptitude are: (a) high .49, (b) average .35, and (c) low -.48. In addition, the individual and total scale coefficients are generally in the .27 to .81 range, although most coefficients are below .50. Several of the correlations were significant at the $p < .05$, $p < .01$, and/or $p < .001$ level of significance.

While the Teacher Ratings are highly reliable measures in terms of internal consistency and stability, they have a low to moderate relationship or agreement with the Performance Test. The data suggest that the Teacher Ratings, similar to the Student Self-Ratings, are probably detecting student characteristics or variables other than vocational programs, gender, or level of mathematics aptitude. For example, some teachers may be underestimating their students' skills while other teachers may be overestimating their students' skills relative to scores on the Performance Test. The Teacher Ratings may also be detecting other psychological variables. Therefore, when using the Teacher Ratings, school personnel should be aware that an individual teacher's ratings of his/her students may be somewhat higher or lower than the students' actual scores on the Performance Test.

Administration

One Teacher Ratings instrument is to be used for each student who is being assessed at a given time. The Teacher Ratings include directions and an example for completing the Ratings. On the first page of the Ratings, the teacher may write his/her student's name, write his/her name, write the name of his/her school, check (✓) his/her vocational program area, and write the name of his/her vocational program. Teachers are then directed to "Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills." At the end of the Ratings, in the spaces provided, teachers may also write comments about their students' mathematics skills.

Teachers should use as much time as is necessary to complete the Ratings for each student. The teacher may decide to stop the assessment at a logical point (e.g., at the end of a scale) and continue at a later time. Teachers should not use the results of the Teacher Ratings instrument to affect a student's admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Teacher Ratings instrument, similar to the Student Self-Ratings instrument, may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the Ratings are interpreted for each individual skill, each descriptor (i.e., "Cannot Do," "Cannot Do Too Well," "Can Do Fairly Well," "Can Do Well") may describe a teacher's report of a student's skill level. For

example, a rating of "4" or "Can Do Well" on a specific skill may indicate a high level of skill proficiency--assuming no overestimation--(see pages 31 and 32) for an individual student. Thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a rating of "1" or "Cannot Do" may likely suggest that a low skill level exists (assuming no underestimation; see page 32) and that learning prescriptions including remedial or support services are probably needed for an individual student.

A rating of "2" or "Cannot Do Too Well" may indicate that perhaps some (i.e., average) skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases, the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. A rating of "3" or "Can Do Fairly Well" (i.e., average skill proficiency) most likely indicates that in many situations a student can perform a skill but may have difficulty at times during different stages of making calculations and problem solving. Similarly, a learning prescription should focus on those areas causing some difficulty for students. Scoring and interpreting individual skills probably is most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Teacher Ratings may also be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained and may include: (a) 1-1.99 average rating; low skill proficiency, (b) 2.00-2.99 average rating; average skill proficiency, and (c) 3.00-4.00 average rating; high skill proficiency. For example, a 3.5 average

2

skill rating on a scale (e.g., whole numbers scale, skills 1-5) or the total instrument (all 7 scales and 28 skills) may indicate a moderately high report of skill proficiency. Minimal, if any, additional instructional or support services may be needed for an individual student to attain the mathematics skills required for success in his/her vocational program. An average skill rating of 1.5, however, probably would suggest that additional instruction, remedial, and/or support services are necessary for assisting a student to attain required skill levels.

It should also be noted again that an individual teacher's ratings on specific skills and scales, or the total instrument, may be somewhat overestimated or underestimated relative to his/her students' scores on the Generalizable Mathematics Skills Performance Test. However, as teachers use the Teacher Ratings more frequently, they should become more knowledgeable about their students' learning strengths and functional learning problems. Further, for teachers who underestimate or overestimate their students' generalizable mathematics skills, use of the Teacher Ratings should assist their reports to become consistent with their students' actual performance (scores).

The teacher may use the "Skill Profile" provided with the Teacher Ratings instrument (see Appendix D). The Ratings may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Teacher Ratings instrument, as stated previously, has potential for allowing teachers to become more familiar with the learning strengths and functional learning problems of stu-

dents in their vocational programs. The Teacher Ratings could, therefore, be useful throughout a student's vocational course or program.

The Teacher Ratings could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school personnel should plan for and use the Teacher Ratings as frequently as necessary, based on individual student needs.

The information and interpretation of the Ratings should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Student Self-Ratings Assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Teacher Ratings, Student Self-Ratings, and Performance Test for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills, provides unique input about student skill proficiencies by using different strategies.

In summary, the Teacher Ratings have several uses which may include:

- Creating an increased awareness in the teacher of the mathematics skills requirements of his/her vocational program.
- Permitting the teacher to become more directly involved in the assessment process.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.
- Providing information useful for developing individualized vocational/career programs.

Performance Test

Instrument Development

The purpose of the Generalizable Mathematics Skills Performance Test Assessment instrument (See Appendix E) is to assess how well students can perform generalizable mathematics skills as measured by a performance test. The same scales, skills, items, and procedures used to develop the Student Self-Ratings and Teacher Ratings instruments were used to develop the Performance Test instrument. However, the design, format, and nature of the item content was different from the Student Self-Ratings and Teacher Ratings.

Each of the generalizable mathematics skills were translated into 7 scales and 150 instrument items and included: (a) Whole Numbers Scale (25 items), (b) Fractions Scale (34 items), (c) Decimals Scale (43 items), (d) Percent Scale (9 items), (e) Mixed Operations Scale (15 items), (f) Measurement and Calculation Scale (20 items) and (g) Estimation Scale (4 items). A three-distractor multiple-choice format is used to measure each skill. Directions and an example are provided to assist students in using the instrument.

Several drafts of the Performance Test were developed and reviewed by a panel of experts which included teachers, students, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing the revisions of the Performance Test. The instrument was also pilot tested on a random sample of students in selected vocational programs. Based on the collective feedback from the panel of experts and information/data from the pilot testing, the final version of the Generalizable Mathematics Skills Performance Test Assessment instrument was produced. The performance test was then considered to possess a sufficient degree of content and face validity. Extensive field

testing was conducted to estimate the reliability and further validate the Performance Test. The Performance Test Answer Key is provided in Appendix F.

Item Analysis

After extensive field testing, an item analysis was conducted on the Performance Test. The major purpose of the item analysis was to examine each of the 150 items for their degrees of difficulty and discrimination ability. Item difficulty is based on how many persons answer an item correctly. Therefore, if most persons respond correctly to a particular item, that item would be considered an "easy item." Conversely, if few people answer an item correctly, that item would be considered a "difficult item." If approximately one-half of all the persons taking a test answer an item correctly and one-half incorrectly, that item would be considered moderately easy or difficult.

Item discrimination indicates the extent to which a particular item "discriminates" between those persons who score in the upper 50% of scores and those persons who score in the lower 50% of scores. If an item discriminates well, those persons who scored in the upper 50% should answer the item correctly, and those who score in the lower 50% should answer the item incorrectly. If an item does not discriminate well, the reverse is true. Therefore, for each item, the key (right answer) should discriminate positively, and each distractor (wrong answer) should discriminate negatively. In addition, each distractor should have at least some responses.

The item analysis was conducted on the Performance Test for all students, each of 15 vocational programs, males and females, and students who have high, average, and low levels of mathematics aptitude. The analysis indicates that the Performance Test is moderately difficult and discriminates

well between those students who score high and those students who score low. In addition, the key and three (3) distractors for each of the 150 items were checked for (a) miskeying (wrong answer), (b) guessing, and (c) ambiguity. The information obtained from the item analysis was used to revise individual items in the Performance Test. Individual items (stems, keys, and distractors) were revised as needed. The Performance Test was then considered to possess a high degree of content and face validity.

Reliability

Internal Consistency Reliability

The internal consistency reliability of the total Performance Test is .97 (Kuder-Richardson -21 (KR-21)). This value indicates that the instrument is very highly internally consistent and is measuring a uniform or single construct of generalizable mathematics skills. The standard error of measurement (SEM) for the total instrument is 4.73. The SEM means that a person's true score on the Performance Test will be ± 4.73 points from his/her obtained score 68% of the time. A person's true score will be ± 9.46 (2 SEMs) points from his/her obtained score 95% of the time, or ± 14.19 (3 SEMs) points 99% of the time. For 15 vocational programs the reliability coefficients range from .90 to .98 and the SEM ranges from 3.78 to 4.86. The coefficients for males and females are .99, and the SEM is 3.97 and 4.02, respectively. The Performance Test is also highly internally consistent for students with different levels of mathematics aptitude as measured by the Performance Test (high: .97, average: .96, low: .95) and the SEMs are 4.32, 4.45 and 4.16, respectively. The data indicate that the Generalizable Mathematics Skills Performance Test Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, and low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Performance Test instrument is $r = .65$. This correlation is significant at the .001 level of significance and indicates that the Performance Test re-administered over time (14 days) to the same students produces similar results, and is, therefore capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .53 to .99 with most correlations above .85. The coefficients for males is .44 and for females is .79. The correlations for students with different levels of mathematics aptitude are high: .85, average: .50, low: -.26. In addition, the individual and total scale coefficients are generally in the .40 to .99 range with most coefficients above .60. Most of the correlations are significant at the $p < .05$, $p < .01$, and/or $p < .001$ level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Performance Test Assessment instrument generally possesses an acceptable level of test-retest reliability and is a moderate to high stable measure for different vocational programs, males and females, and students who have high, average, and low mathematics aptitude.

Validity

Construct Validity

The relationship or extent of agreement between the Student Self-Ratings or Teacher Ratings with the Performance Test, as measured by correlation, was low to moderate. The correlations between the Student Self-Ratings and the Performance Test range from .17 to .72, although most coefficients are below .60. The correlations between the Teacher Ratings and the Performance Test range from .27 to .81, although most coefficients are below .50. While the Student Self-Ratings, Teacher Ratings, and Performance Test are

highly reliable measures, the Student Self-Ratings and Teacher Ratings are probably detecting psychological variables not detected by the Performance Test. The scores on the Student Self-Ratings and Teacher Ratings, therefore, may be somewhat higher or lower than Performance Test scores for individual students.

Administration

The Performance Test includes directions and an example for completing the Test. On the first page of the Ratings, the student may write his/her name, write his/her teacher's name, write the name of his/her school, check (✓) his/her vocational program area, and write the name of his/her vocational program. Students are then directed to "Do each of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers."

Students should be permitted as much time as is necessary to complete the Performance Test. The administrator (e.g., teacher, counselor) of the Test may decide to stop the assessment at a logical point (i.e., at the end of a scale) and continue at a later time. Students should understand that the results of the Performance Test instrument will not affect their admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Performance Test instrument may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the items are interpreted for each skill, correct or incorrect responses provide an indication of skill proficiency. For example, a correct

response on a particular item may indicate skill proficiency for an individual student. Thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a wrong answer on a particular item indicates a lack of skill proficiency and that learning prescriptions including remedial or support services are probably needed for an individual student. A wrong answer may also suggest that some skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases; the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. Scoring and interpreting individual skills is probably most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Performance Test also may be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained based on raw scores on the total instrument and may include: (a) 0-50; ~~low~~ skill proficiency, (b) 51-100; average skill proficiency, and (c) 101-150; high skill proficiency. For example, a raw score of 38 on the total instrument (all 7 scales and 150 items) indicates a low skill proficiency for a student. Likewise, students who obtain raw scores of 75 and 140 would be considered to have average and high skill proficiency, respectively. A score of 140 on the total instrument probably indicates that minimal, if any, additional instructional or support services are needed for an individual student to attain the mathematics skills required for success in his/her vocational program. However, a score of 75 (average skill proficiency) or 38 (low skill

proficiency) strongly suggests that additional instruction and remedial or support services are necessary for assisting a student to attain the required skill levels.

The Performance Test may be scored and results interpreted by individual scales using similar procedures used for the total instrument (see Table 1). For example, the whole numbers scale includes 25 items involving different kinds of skills. Raw scores of 1-8, 9-17, and 18-25 may be interpreted as low, average, and high skill proficiencies for individual students, respectively. The teacher should focus on those items the student answers incorrectly and prescribe the necessary additional instruction and remedial or support services, accordingly.

The teacher may use the "Skill Profile" provided with the Performance Test instrument (See Appendix E). The Test scores may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Performance Test Instrument has potential for allowing students to become more familiar with the mathematics skills requirements of their programs and become more cognizant of their learning strengths and functional learning problems. The Performance Test could be useful throughout a student's vocational course or program.

The Performance Test could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school per-

sonnel should plan for and use the Performance Test as frequently as necessary, based on individual student needs.

The information and interpretation of the Performance Test information should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Performance Test assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Performance Test, Student Self-Ratings, and Teacher Ratings for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills provides unique input about student skill proficiencies by using different strategies.

In summary, the Performance Test has several uses which may include:

- Creating an awareness in students and teachers of the mathematics skills requirements of their vocational programs.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.
- Providing information useful for developing individualized vocational/career programs.

Use of the Student Self-Ratings and Teacher Ratings With the Performance Test Assessment Instrument

The previous sections discussed the development, reliability, validity, administration, scoring, and uses of the Student Self-Ratings, Teacher Ratings, and Performance Test Assessment instruments. The instruments have similar and unique uses and are designed to measure the same generalizable mathematics skills using different strategies and procedures. This section discusses how the teacher or other school personnel may use the instruments and how the scores may be used and interpreted. The uses are described for individual skills, scales, and the total instruments.

The teacher should examine the color charts in Appendix B when assessing his/her students' mathematics skills by identifying their own programs and those skills which have high generalizability (blue), medium generalizability (yellow), and low generalizability (white). The skills illustrated in blue should receive the most emphasis when using the assessment instruments, while planning curriculum, and when teaching. The teacher may place less emphasis on those skills illustrated in yellow and minimal emphasis might be placed on those skills illustrated in white. Table 1 describes the relationship of the skills listed on the Student Self-Ratings and Teacher Ratings with the items included on the Performance Test. It will assist the teacher in interpreting the Ratings and scores on the Performance Test. The Ratings and Performance Test scores indicate students who possess (a) high skill proficiency, (b) average skill proficiency, and (c) low skill proficiency:

<u>High Skill Proficiency</u>	A student possesses an adequate level of generalizable mathematics skills and requires minimal, if any, additional instruction or support/remedial services necessary to succeed in his/her vocational program.
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Average Skill Proficiency A student possesses a marginally adequate level of generalizable mathematics skills and requires a moderate amount of additional instruction and/or support/remedial services necessary to succeed in his/her vocational program.

Low Skill Proficiency A student possesses an inadequate level of generalizable mathematics skills and requires a considerable amount of additional instruction and/or support/remedial services to succeed in his/her vocational program.

The Student Self-Ratings or Teacher Ratings may be somewhat higher or lower than the scores on the Performance Test for individual students. The Ratings may be either underestimated, overestimated, or consistent with the scores on the Performance Test and are defined as follows:

Underestimation: When a Student Self-Rating or Teacher Rating is at a lower level than a score on the Performance Test (e.g., average Student Self-Rating and a high Performance Test score, low Teacher Rating and an average Performance Test score).

Overestimation: When a Student Self-Rating or Teacher Rating is at a higher level than a score on the Performance Test (e.g., high Student Self-Rating and an average Performance Test score, average Teacher Rating and low Performance Test score).

Consistent: When a Student Self-Rating or Teacher Rating is at the same level as a score on the Performance Test (e.g., high Student Self-Rating and a high Performance Test score, average Teacher Rating and an average Performance Test score, low Student Self-Rating and a low Performance Test score).

These definitions along with Table 1 will be helpful when interpreting the Ratings and Performance Test scores for individual skills, scales, and total instruments.

Table 1

Relationship of the Skills Listed on the Student Self-Ratings and Teacher Ratings with the Items Included on the Performance Test

Student Self-Ratings and Teacher Ratings Skills (Range of Responses)	Performance Test Items (Range of Responses)
4-"Can Do Well" (High) 3-"Can Do Fairly Well" (Average) 2-"Cannot Do Too Well" (Average) 1-"Cannot Do" (Low)	"Correct Items"/ "Incorrect Items"
<hr/>	
<u>Whole Numbers</u>	
1. Read, write, and count whole numbers	1-6 (High: 5-6) (Average: 3-4) (Low: 1-2)
2. Add and subtract whole numbers	7-12 (High: 5-6) (Average: 3-4) (Low: 1-2)
3. Multiply and divide whole numbers	13-18 (High: 5-6) (Average: 3-4) (Low: 1-2)
4. Add, subtract, multiply, and divide whole numbers to solve word problems	19-22 (High: 4) (Average: 2-3) (Low: 1)
5. Round off whole numbers	23-25 (High: 3) (Average: 2) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)	(High: 18-25) (Average: 9-17) (n=25 items) (Low: 1-8)

Fractions

6. Read and write common fractions

26-31 (High: 5-6)
(Average: 3-4)
(Low: 1-2)

7. Add and subtract common fractions

32-43 (High: 9-12)
(Average: 5-8)
(Low: 1-4)

8. Multiply and divide common fractions

44-55 (High: 9-12)
(Average: 5-8)
(Low: 1-4)

9. Add, subtract, multiply, and divide
common fractions to solve word problems

56-59 (High: 4)
(Average: 2-3)
(Low: 1)

(High: 3-4.00)
(Average: 2-2.99)
(Low: 1-1.99)

(High: 24-34)
(Average: 13-23) (n=34 items)
(Low: 1-12)

Decimals

10. Read and write decimals

60-63 (High: 4)
(Average: 2-3)
(Low: 1)

11. Add and subtract decimals

64-75 (High: 9-12)
(Average: 5-8)
(Low: 1-4)

12. Multiply and divide decimals

76-87 (High: 9-12)
(Average: 5-8)
(Low: 1-4)

13. Add, subtract, multiply, and divide
common decimals to solve word problems

88-91 (High: 4)
(Average: 2-3)
(Low: 1)

14. Solve problems involving dollars and
cents

92-99 (High: 6-8)
(Average: 3-5)
(Low: 1-2)

15. Round off decimals

100-102 (High: 3)
(Average: 2)
(Low: 1)

(High: 3-4.00)
(Average: 2-2.99)
(Low: 1-1.99)

(High: 30-43)
(Average: 16-29) (n=43 items)
(Low: 1-15)

Percent

16. Read and write percents

103-108 (High: 5-6)
(Average: 3-4)
(Low: 1-2)

17. Solve word problems involving percents

109-111 (High: 3)
(Average: 2)
(Low: 1)

(High: 3-4.00)

(Average: 2-2.99)

(Low: 1-1.99)

(High: 7-9)

(Average: 4-6) (n=9 items)

(Low: 1-3)

Mixed Operations

18. Change fractions to decimals,
percents to fractions,
fractions to percents,
percents to decimals,
decimals to percents,
fractions or mixed numbers
to decimal fractions, decimal
fractions to fractions or
mixed numbers

112-120 (High: 7-9)
(Average: 4-6)
(Low: 1-3)

19. Solve word problems by selecting
and using the correct order of
addition, subtraction, multiplication,
and division for whole numbers,
fractions, decimals, and percents

121-123 (High: 3)
(Average: 2)
(Low: 1)

20. Find averages (means)

124-126 (High: 3)
(Average: 2)
(Low: 1)

21. Do written calculations quickly

N/A

(High: 3-4.00)

(Average: 2-2.99)

(Low: 1-1.99)

(High: 11-15)

(Average: 6-10) (n=15 items)

(Low: 1-5)

Measurement and Calculation

22. Read numbers or symbols from time, weight, distance, and volume measuring scales

127-133 (High: 6-7)
(Average: 3-5)
(Low: 1-2)

23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units

N/A

24. Use measuring scales to determine an object's weight, distance, and volume in metric units

N/A

25. Do basic metric conversions involving weight, distance, and volume

134-139 (High: 5-6)
(Average: 3-4)
(Low: 1-2)

26. Solve problems involving time, weight, distance, and volume

140-146 (High: 6-7)
(Average: 3-5)
(Low: 1-2)

27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division

N/A

(High: 3-4.00)
(Average: 2-2.99)
(Low: 1-1.99)

(High: 15-20)
(Average: 8-14) (n=20 items)
(Low: 1-7)

Estimation

28. Determine if a solution or answer to a mathematics problem is reasonable

147-150 (High: 4)
(Average: 2-3)
(Low: 1)

(High: 3-4.00)
(Average: 2-2.99)
(Low: 1-1.99)

(High: 4)
(Average: 2-3) (n=4 items)
(Low: 1)

Total Instrument

(High: 3-4.00)
(Average: 2-2.99)
(Low: 1-1.99)

(High: 101-150)
(Average: 51-100) (n=150 items)
(Low: 0-50)

Individual Skills

The assessment of individual skills using the Student Self-Ratings, Teacher Ratings, or Performance Test was described previously. Correct or incorrect answers on the Performance Test may be compared to responses on the Student Self-Ratings or Teacher Ratings. The scores on either the Student Self-Rating and/or Teacher Rating instruments may be compared with corresponding Performance Test scores for individual skills. The comparisons relate whether the Student Self-Ratings and/or Teacher Ratings are consistent, overestimated, or underestimated relative to a student's score on the Performance Test for an individual skill. Table 2 and the text which follows it provide examples of how scores on the Student Self-Rating or Teacher Rating instruments can be compared and interpreted with scores on the Performance Test for individual skills.

Table 2
Examples of Comparisons and Interpretations of Student Self-Ratings
and Teacher Ratings With Performance Test Scores
for An Individual Skill

Skill	Student Self-Rating	Teacher Rating	Performance Test Score
Read, Write, and Count Whole Numbers	4(overestimation)	3(overestimation)	1
	2(overestimation)	1(consistent)	2
	4(consistent)	1(underestimation)	6
	1(underestimation)	2(underestimation)	5
	2(consistent)	4(overestimation)	3
	3(consistent)	3(consistent)	4

If, on the "Whole Numbers" Scale, skill #1: Read, Write, and Count Whole Numbers, a rating of "4" or "Can Do Well" was obtained on the Student

Self-Ratings and a score of 1 (1 of 6 items correct) was obtained on the Performance Test for an individual student, this would indicate an overestimation of the student's skill level. The teacher may use the results to assist and counsel the student to better understand his/her learning strengths. A close examination of the Performance Test could help specify student learning strengths and problems.

Conversely, a score of "2" or "Cannot Do Too Well" on the Teacher Ratings and a total score of "5" on items 1-6 on the Performance Test would indicate an underestimation of a student's skill. Similarly, the teacher could examine his/her observations and perceptions of the student to acquire a clearer idea of the student's learning strengths based on the results of the Performance Test.

A score of "3" or "Can Do Fairly Well" on the Student Self-Ratings and a score of "4" on the Performance Test may indicate a relatively accurate and consistent diagnosis of a student's mathematics skill level. The scores on the Student Self-Ratings and Teacher Ratings may be compared with the Performance Test scores and interpreted, similarly, for the other 27 individual skills contained in each of the 7 scales.

Scales

Average scale ratings on the Student Self-Ratings or Teacher Ratings may be compared to scale scores on the Performance Test. The comparisons relate whether the student Self-Ratings or Teacher Ratings are consistent, overestimated, or underestimated relative to a student's score on the Performance Test for an individual scale. Table 3 and the text which follows it provide examples of how average scale scores on the Student Self-Rating or Teacher Rating instruments can be compared and interpreted with scale scores on the Performance Test for individual scales.

Table 3

Examples of Comparisons and Interpretations of Student Self-Ratings
and Teacher Ratings With Performance Test Scores
for An Individual Scale

Scale	Student Self-Rating	Teacher Rating	Performance Test Score
Fractions	2.65(consistent)	3.44(overestimation)	15
	3.90(overestimation)	2.45(consistent)	22
	2.88(consistent)	2.63(consistent)	20
	3.50(overestimation)	2.78(overestimation)	10
	1.96(underestimation)	2.22(underestimation)	29
	3.24(consistent)	1.80(underestimation)	33

If on the "Fractions" scale (items 6-9), an average rating of 3.90 on the Student Self-Ratings and a score of 22 (22 of 34 items correct) was obtained on the Performance Test "fractions" scale for an individual student, this would indicate an overestimation of a student's skill level. Similar to the case of individual skills, the teacher may use the results to assist and counsel the student to better understand his/her learning strengths.

An average score of 2.22 on the Teacher Ratings and a total scale score of 29 (29 of 32 items correct) obtained on the Performance Test "fractions" scale for an individual student would suggest an underestimation of a student's skill level. The teacher may also examine his/her perception of the student to obtain a better idea of the student's learning strengths. A close examination of the Performance Test results could specify student learning strengths and problems.

An average score of 3.24 on the Student Self-Ratings and a score of 33 (33 of 34 items correct) on the "fractions" scale, on the Performance Test probably would indicate a relatively accurate and consistent diagnosis of a student's skill level. The scores on the Student Self-Ratings and Teacher Ratings may be compared with the Performance Test scores and interpreted, similarly, for the other 6 scales.

Total Instrument

Average ratings on the total Student Self-Ratings or Teacher Ratings may also be compared to total scores on the Performance Test. The comparisons relate whether the average ratings on the total Student Self-Ratings or Teacher Ratings are consistent with, overestimated, or underestimated relative to a student's total score on the Performance Test. Table 4 and the text which follows it provide examples of how average scores on the total Student Self-Rating or Teacher Rating instruments can be compared and interpreted with total scores on the Performance Test.

Table 4

Examples of Comparisons and Interpretations of Total Student Self-Ratings and Teacher Ratings With Total Performance Test Scores

Student Self-Rating	Teacher Rating	Performance Test Score
1.14(consistent)	3.75(overestimation)	22
3.23(overestimation)	2.82(consistent)	76
2.48(overestimation)	3.53(overestimation)	37
3.76(consistent)	3.94(consistent)	138
1.53(underestimation)	2.32(underestimation)	147
2.64(consistent)	1.25(underestimation)	53

If an average rating of 2.48 on the Student Self-Ratings and a score of 37 (37 of 150 items correct on the total instrument) on the Performance Test for an individual student would indicate an overestimation of a student's mathematics skills. The teacher, again, may use the results and counsel the student to better understand and identify his/her learning strengths.

An average score of 2.32 on the total Teacher Ratings and a total instrument score of 147 (147 of 150 items correct) obtained on the Performance Test for an individual student would suggest an underestimation of a student's skills. The teacher could also examine his/her perceptions of the student to obtain a clearer idea of the student's learning strengths. Therefore, a close examination of the Performance Test could identify specific student learning strengths and problems, and suggest the necessary learning prescriptions necessary to increase the student's skill levels.




An average score of 2.64 on the Student Self-Ratings and a score of 53 (53 of 150 items correct on the total instrument) on the Performance Test most likely indicates a relatively accurate and consistent diagnosis of a student's skill level.

Appendices

Appendix A

Generalizable Mathematics Skills

KEY

-  - High Generalizability
(\bar{x} = 5.01 - 7.00)
-  - Medium Generalizability
(\bar{x} = 3.00 - 5.00)
-  - Low Generalizability
(\bar{x} = 1.00 - 2.99)

Mathematics Skills**Whole Numbers**

1. Read, write, and count single and multiple digit whole numbers
2. Add and subtract single and multiple digit whole numbers
3. Multiply and divide single and multiple digit whole numbers
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers
5. Round off single and multiple digit whole numbers

Fractions

6. Read and write common fractions
7. Add and subtract common fractions
8. Multiply and divide common fractions
9. Solve word problems with common fractions

Decimals

10. Carry out arithmetic computations involving dollars and cents
11. Read and write decimals in one and more places
12. Round off decimals to one or more places
13. Multiply and divide decimals in one or more places
14. Add and subtract decimals in one or more places
15. Solve word problems with decimals in one or more places

Percent

16. Read and write percents
17. Compute percents

Vocational Training Areas and Programs

Agricultural Occs.									
Agricultural Mechanics									
Ornamental Horticulture									
Agricultural Cooperative Education									
Conservation									
Cooperative Work Training (CWT)									
All Agricultural Occupations Programs									
Business, Marketing and Management Occs.									
Advertising Services									
General Merchandise (Sales)									
Personal Services (Sales)									
Marketing Cooperative (D.E.)									
Accounting and Computing Occupations									
Business Data Processing Systems									
Computer Programming									
Filing, Office Machines									
General Office Clerking									
Executive Secretary Science									
Secretarial									
Office Occupations Cooperative Education									
Cooperative Work Training (CWT)									
Word Processing									
Hospitality (Travel and Travel Service)									
Clerical Occupations									
Office Occupations									
All Bus., Market., and Mgmt. Occupations Programs									
Health Occupations									
Dental Assisting									
Practical Nursing									
Nurse Aide									
Health Care Aide									
Medical Assisting									
Health Aide									
Medical Records									
Health Occupations Cooperative Education									
Cooperative Work Training (CWT)									
Health Occupations									
All Health Occupations Programs									
Home Economics Occs.									
Child Care									
Clothing Management, Production, and Service									
Food Management, Production, and Service									
Home Economics Cooperative Education									
Interior Decorating									
Child Development									
Cooperative Work Training (CWT)									
All Home Economics Occupations Programs									
Industrial Occupations									
Air Conditioning									
Heating									
Appliance Repair									
Automotive Services									
Body and Fender Repair									
Auto Mechanics									
Aircraft Maintenance									
Commercial Art									
Construction and Building Trades									
Carpentry									
Industrial Maintenance									
Diesel Mechanic									
Drafting									
Electrical Occupations									
Industrial Electrician									
Electronic Occupations									
Radio/Television Repair									
Graphic Arts									
Machine Shop									
Combine Metal Trades									
Welding									
Tool and Die Making									
Cosmetology									
Refrigeration									
Small Engine Repair									
Millwork and Cabinet Making									
Industrial Cooperative Education									
Cooperative Work Training (CWT)									
Truck Driving									
Warehousing									
Home Remodeling and Renovation									
Custodial Maintenance									
Communications and Media Specialist									
All Industrial Occupations Programs									

ALL VOCATIONAL TRAINING AREAS AND PROGRAMS

KEY

- ☒ - High Generalizability
(\bar{x} = 5.01 - 7.00)
- ☐ - Medium Generalizability
(\bar{x} = 3.00 - 5.00)
- ☐ - Low Generalizability
(\bar{x} = 1.00 - 2.99)

Mixed Operations

18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers
19. Solve word problems by selecting and using correct order of operations
20. Perform written calculations quickly
21. Compute averages

Measurement and Calculation

22. Read numbers or symbols from time, weight, distance, and volume measuring scales
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units
24. Use a measuring device to determine an object's weight, distance, or volume in metric units
25. Perform basic metric conversions involving weight, distance, and volume
26. Solve problems involving time, weight, distance, and volume
27. Use a calculator to perform basic arithmetic operations to solve problems

Estimation

28. Determine if a solution to a mathematical problem is reasonable

Vocational Training Areas and Programs																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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ALL VOCATIONAL TRAINING AREAS AND PROGRAMS

Appendix B

Additional Important Mathematics Skills

Business, Marketing, and Management Occupations Programs

<u>Program</u>	<u>Skill</u>
Advertising Services General Merchandise (Sales)	<ul style="list-style-type: none">• Calculate discounts and use them in problems
Business Data Processing Systems Computer Programming	<ul style="list-style-type: none">• Use of base 2 and 16 arithmetic• Understand algebraic concepts• Provide proof of results obtained
Secretarial	<ul style="list-style-type: none">• Use touch-method of using calculator• Accuracy and speed in using calculator
Office Occupations	<ul style="list-style-type: none">• Verify answers

Health Occupations Programs

<u>Program</u>	<u>Skill</u>
Practical Nursing	<ul style="list-style-type: none">• Read a centigrade thermometer and convert to Fahrenheit• Solve word problems using measurements based on apothecaries' and household measurements• Solve ratio and proportion problems• Use complex metrics and apothecaries' systems

Industrial Occupations Programs

Mathematics

<u>Program</u>	<u>Skill</u>
Air Conditioning Heating Refrigeration Electronics Occupations Machine Shop Tool and Die Making	<ul style="list-style-type: none">• Use basic trigonometric functions
Auto Mechanics	<ul style="list-style-type: none">• Apply degrees of rotation to a graph
Commercial Art	<ul style="list-style-type: none">• Enlarge or reduce proportional sizes
Diesel Mechanics	<ul style="list-style-type: none">• Convert pounds to foot* pounds and foot pounds to pounds
Electrical Occupations Electronics Occupations	<ul style="list-style-type: none">• Find square root• Use binary math• Use scientific notation• Use algebraic equations and formulas for solving unknowns• Use a measuring device to measure electronic quantities
Air Conditioning Combine Metal Trades Machine Shop Welding	<ul style="list-style-type: none">• Use basic geometry (e.g., area, circumference, volume)
Machine Shop Tool and Die Making Industrial Electrician Electronics Occupations Electrical Occupations	<ul style="list-style-type: none">• Use algebra
Electronics Occupations Electrical Occupations	<ul style="list-style-type: none">• Check answers for accuracy• Find formulas to solve problems

Appendix C

Student Self-Ratings

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Student Self-Ratings

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (✓) your vocational program area, and write the name of your vocational program.

Student Name: _____

Teacher Name: _____

School: _____

Vocational Program Area/Program:

_____ Agricultural Occupations: _____

_____ Business, Marketing, and Management Occupations: _____

_____ Health Occupations: _____

_____ Home Economics Occupations: _____

_____ Industrial Occupations: _____

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

3. Multiply and divide whole numbers

examples:

Multiply:

Divide:

$$\begin{array}{r} 80 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 543 \\ \times 81 \\ \hline \end{array}$$

$$7 \overline{)147}$$

$$125 \overline{)34,318}$$

1

2

3

4

4. Add, subtract, multiply, and divide whole numbers to solve word problems

1

2

3

4

5. Round off whole numbers

1

2

3

4

FRACTIONS

6. Read and write common fractions

examples:

$\frac{1}{8}$, one-eighth

$\frac{5}{4}$, five-fourths

$3\frac{6}{7}$, three and six-sevenths

1

2

3

4

61

TURN PAGE

Directions: Indicate, by circling the number, how well you believe you can do each of the following mathematics skills.

Example:

Degree of Skill

Mathematics Skill

Cannot Do Cannot Do Too Well Can Do Fairly Well Can Do Well

Read and write common fractions

1 2 ③ 4

Degree of Skill

Mathematics Skills

Cannot Do Cannot Do Too Well Can Do Fairly Well Can Do Well

WHOLE NUMBERS

1. Read, write, and count whole numbers

examples:

6, six

54, fifty-four

375, three hundred seventy-five

4,128; four thousand one hundred twenty-eight

1 2 3 4

2. Add and subtract whole numbers

examples:

Add:

$$\begin{array}{r} 8 \\ +3 \\ \hline 15,821 \\ +3,147 \\ \hline 195 \end{array}$$

Subtract:

$$\begin{array}{r} 76 \\ -23 \\ \hline 12,872 \\ -983 \\ \hline \end{array}$$

1 2 3 4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

7. Add and subtract common fractions

examples:

Add:

$$\begin{array}{r} \frac{2}{5} \\ + \frac{1}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ + \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 10\frac{1}{2} \\ + 4\frac{1}{4} \\ \hline \end{array}$$

Subtract:

$$\begin{array}{r} \frac{6}{7} \\ - \frac{3}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{9} \\ - \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 18\frac{2}{3} \\ - 15\frac{1}{6} \\ \hline \end{array}$$

1

2

3

4

8. Multiply and divide common fractions

examples:

Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $\begin{array}{r} 12 \\ \times 4\frac{3}{5} \\ \hline \end{array}$

Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\begin{array}{r} 9\frac{7}{15} \\ \underline{4\frac{2}{5}} \end{array}$

1

2

3

4

9. Add, subtract, multiply, and divide common fractions to solve word problems

1

2

3

4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

DECIMALS

10. Read and write decimals

examples:

.2, two-tenths

.43, forty-three hundredths

.875, eight hundred seventy-five thousandths

.0964, nine hundred sixty-four ten thousandths

1

2

3

4

11. Add and subtract decimals

examples:

Add: $\begin{array}{r} .3 \\ .1 \\ +.2 \\ \hline \end{array}$

$125.2 + 38.3 + 16.8$

$.00789 + .00023$

Subtract: $\begin{array}{r} .7 \\ -.2 \\ \hline \end{array}$

$320.8 - 18.6$

$124 - .009$

1

2

3

4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too WellCan Do
Fairly WellCan Do
Well

12. Multiply and divide decimals

examples:

Multiply: $\begin{array}{r} .6 \\ \times 3 \end{array}$ $\begin{array}{r} 110 \\ \times .854 \end{array}$ $1,425 \times 7.63$

Divide: $15/8.70$ $75.2/128.764$ $8 \div .004$ 1

2 3 4

13. Add, subtract, multiply, and divide common decimals to solve word problems

1

2 3 4

14. Solve problems involving dollars and cents

1

2 3 4

15. Round off decimals

1

2 3 4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

PERCENT

16. Read and write percents

examples:

32%, thirty-two percent

$8\frac{1}{3}\%$, eight and one-third percent

115.6%, one hundred fifteen and six-tenths percent

1

2

3

4

17. Solve problems involving percents

1

2

3

4

MIXED OPERATIONS

18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers

1

2

3

4

19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents

1

2

3

4

Mathematics Skills

Degree of Skill

	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
20. Find averages (means)	1	2	3	4
21. Do written calculations quickly	1	2	3	4

MEASUREMENT AND CALCULATION

22. Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4
25. Do basic metric conversions involving weight, distance, and volume	1	2	3	4
26. Solve problems involving time, weight, distance, and volume	1	2	3	4
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well.

Can Do
Fairly Well

Can Do
Well

ESTIMATION

28. Determine if a solution or answer to a mathematics problem is reasonable

1

2

3

4

In the following spaces, you may write comments about your mathematics skills:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT
STUDENT SELF-RATINGS
SKILL PROFILE

<u>Scales/Skills</u>	<u>Item Number</u>	<u>Student Self-Rating</u>
WHOLE NUMBERS		
read, write, and count	1	_____
add and subtract	2	_____
multiply and divide	3	_____
solve word problems	4	_____
round off	5	_____
		Total Average(/5) _____
FRACTIONS		
read and write	6	_____
add and subtract	7	_____
multiply and divide	8	_____
solve word problems	9	_____
		Total Average(/4) _____
DECIMALS		
read and write	10	_____
add and subtract	11	_____
multiply and divide	12	_____
solve word problems	13	_____
solve dollars and cents problems	14	_____
round off	15	_____
		Total Average(/6) _____
PERCENT		
read and write	16	_____
solve problems	17	_____
		Total Average(/2) _____
MIXED OPERATIONS		
change fractions, decimals, percents, mixed numbers, and decimal fractions	18	_____
solve word problems	19	_____
find averages	20	_____
do written calculations quickly	21	_____
		Total Average(/4) _____
MEASUREMENT AND CALCULATION		
read time, weight, distance, and volume scales	22	_____
use standard weight, distance, and volume scales	23	_____
use metric weight, distance, and volume scales	24	_____
do basic metric weight, distance, and volume conversions	25	_____
solve time, weight, distance, and volume word problems	26	_____
use a calculator to solve addition, subtraction, multiplication, and division problems	27	_____
		Total Average(/6) _____
ESTIMATION		
determine if a solution or answer to a mathematics problem is reasonable	28	_____
		Total Average(/6) _____
		TOTAL AVERAGE (/28) _____
		OVER

Comments:

Lined area for handwritten comments.

Appendix D

Teacher Ratings

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Teacher Ratings

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (✓) your vocational program area, and write the name of your vocational program.

Student Name: _____

Teacher Name: _____

School: _____

Vocational Program Area/Program:

_____ Agricultural Occupations: _____

_____ Business, Marketing, and Management Occupations: _____

_____ Health Occupations: _____

_____ Home Economics Occupations: _____

_____ Industrial Occupations: _____

TURN PAGE

80

Directions: Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills.

Example:

Mathematics Skill

Degree of Skill

Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
-----------	-----------------------	-----------------------	----------------

Read and write common fractions

1

2

③

4

Mathematics Skills

Degree of Skill

Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
-----------	-----------------------	-----------------------	----------------

WHOLE NUMBERS

1. Read, write, and count whole numbers

examples:

6, six

54, fifty-four

375, three hundred seventy-five

4,128; four thousand one hundred twenty-eight

1

2

3

4

2. Add and subtract whole numbers

examples:

Add:

$$\begin{array}{r} 8 \quad 15,821 \\ +3 \quad 3,147 \\ \hline \quad \quad + \quad 195 \end{array}$$

Subtract:

$$\begin{array}{r} 76 \quad 12,872 \\ -23 \quad - \quad 983 \\ \hline \end{array}$$

1

2

3

4

Mathematics Skills

Degree of Skill

Cannot Do Cannot Do Can Do Can Do
Too Well Fairly Well Well

3. Multiply and divide whole numbers

examples:

Multiply:

Divide:

$$\begin{array}{r} 80 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 543 \\ \times 81 \\ \hline \end{array}$$

$$7 \overline{)147} \quad 125 \overline{)34,318}$$

1 2 3 4

4. Add, subtract, multiply, and divide whole numbers to solve word problems

1 2 3 4

5. Round off whole numbers

1 2 3 4

FRACTIONS

6. Read and write common fractions

examples:

$\frac{1}{8}$, one-eighth

$\frac{5}{4}$, five-fourths

$3\frac{6}{7}$, three and six-sevenths

1 2 3 4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

7. Add and subtract common fractions

examples:

Add:

$$\begin{array}{r} \frac{2}{5} \\ + \frac{1}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ + \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 10\frac{1}{2} \\ + 4\frac{1}{4} \\ \hline \end{array}$$

Subtract:

$$\begin{array}{r} \frac{6}{7} \\ - \frac{3}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{9} \\ - \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 18\frac{2}{3} \\ - 15\frac{1}{6} \\ \hline \end{array}$$

1

2

3

4

8. Multiply and divide common fractions

examples:

Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $\begin{array}{r} 12 \\ \times 4\frac{3}{5} \\ \hline \end{array}$

Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\begin{array}{r} 9\frac{7}{15} \\ 4\frac{2}{5} \\ \hline \end{array}$

1

2

3

4

9. Add, subtract, multiply, and divide common fractions to solve word problems

1

2

3

4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

DECIMALS

10. Read and write decimals

examples:

.2, two-tenths

.43, forty-three hundredths

.875, eight hundred seventy-five thousandths

.0964, nine hundred sixty-four ten thousandths

1

2

3

4

11. Add and subtract decimals

examples:

Add: $\begin{array}{r} .3 \\ .1 \\ +.2 \\ \hline \end{array}$

$125.2 + 38.3 + 16.8$

$.00789 + .00023$

Subtract: $\begin{array}{r} .7 \\ -.2 \\ \hline \end{array}$

$320.8 - 18.6$

$124 - .009$

1

2

3

4

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

12. Multiply and divide decimals

examples:

Multiply: $\begin{array}{r} .6 \\ \times 3 \end{array}$ $\begin{array}{r} 110 \\ \times .854 \end{array}$ $1,425 \times 7.63$

Divide: $15/8.70$ $75.2/128.764$ $8 \div .004$ 1

2 3 4

13. Add, subtract, multiply, and divide common decimals to solve word problems

1 2 3 4

14. Solve problems involving dollars and cents

1 2 3 4

15. Round off decimals

1 2 3 4

89

TURN PAGE

90

Mathematics Skills

Degree of Skill

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

PERCENT

16. Read and write percents

examples:

32%, thirty-two percent

$8\frac{1}{3}\%$, eight and one-third percent

115.6%, one hundred fifteen and six-tenths percent

1

2

3

4

17. Solve problems involving percents

1

2

3

4

MIXED OPERATIONS

18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers

1

2

3

4

19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents

1

2

3

4

Mathematics Skills

Degree of Skill

	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
20. Find averages (means)	1	2	3	4
21. Do written calculations quickly	1	2	3	4

MEASUREMENT AND CALCULATION

22. Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4
25. Do basic metric conversions involving weight, distance, and volume	1	2	3	4
26. Solve problems involving time, weight, distance, and volume	1	2	3	4
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4

Mathematics Skills

Degree of Skill'

Cannot Do

Cannot Do
Too Well

Can Do
Fairly Well

Can Do
Well

ESTIMATION

28. Determine if a solution or answer to a mathematics problem is reasonable

1

2

2

•

In the following spaces, you may write comments about this student's mathematics skills:

[illegible]

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT
TEACHER RATINGS
SKILL PROFILE

<u>Scales/Skills</u>	<u>Item Number</u>	<u>Teacher Rating</u>
WHOLE NUMBERS		
read, write, and count	1	_____
add and subtract	2	_____
multiply and divide	3	_____
solve word problems	4	_____
round off	5	_____
		Total Average(/5) _____
FRACTIONS		
read and write	6	_____
add and subtract	7	_____
multiply and divide	8	_____
solve word problems	9	_____
		Total Average(/4) _____
DECIMALS		
read and write	10	_____
add and subtract	11	_____
multiply and divide	12	_____
solve word problems	13	_____
solve dollars and cents problems	14	_____
round off	15	_____
		Total Average(/6) _____
PERCENT		
read and write	16	_____
solve problems	17	_____
		Total Average(/2) _____
MIXED OPERATIONS		
change fractions, decimals, percents, mixed numbers, and decimal fractions	18	_____
solve word problems	19	_____
find averages	20	_____
do written calculations quickly	21	_____
		Total Average(/4) _____
MEASUREMENT AND CALCULATION		
read time, weight, distance, and volume scales	22	_____
use standard weight, distance, and volume scales	23	_____
use metric weight, distance, and volume scales	24	_____
do basic metric weight, distance, and volume conversions	25	_____
solve time, weight, distance, and volume word problems	26	_____
use a calculator to solve addition, subtraction, multiplication, and division problems	27	_____
		Total Average(/6) _____
ESTIMATION		
determine if a solution or answer to a mathematics problem is reasonable	28	Total _____
		TOTAL AVERAGE (/28) _____

OVER

Comments:

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Appendix E

Performance Test

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Performance Test

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (✓) your vocational program area, and write the name of your vocational program.

Student Name: _____

Teacher Name: _____

School: _____

Vocational Program Area/Program:

_____ Agricultural Occupations: _____

_____ Business, Marketing, and Management Occupations: _____

_____ Health Occupations: _____

_____ Home Economics Occupations: _____

_____ Industrial Occupations: _____

Directions: Do each of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers.

Example:

Add:
$$\begin{array}{r} 3 \\ +7 \\ \hline \end{array}$$

(a) 6

(b) 25

☒ (c) 15

(d) 5

WHOLE NUMBERS

1. 97 is written as:

(a) nine hundred seven

(b) nine thousand seventy

☒ (c) ninety-seven

(d) seventy-nine

2. 4,132 is written as:

(a) four thousand one hundred thirty-two

(b) forty-one thousand thirty-two

(c) forty-one hundred thirty

(d) four hundred thirty-two

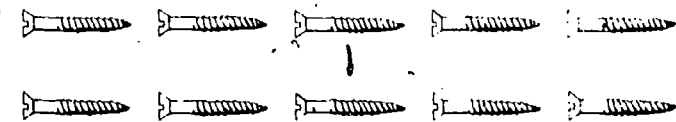
3. Eight is represented by which number?

- (a) 8 (b) 6 (c) 800 (d) 80

4. Five thousand nine hundred nineteen is represented by which number?

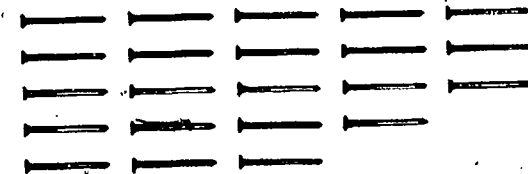
- (a) 519 (b) 59 (c) 591 (d) 5,919

5. How many screws are there in the following diagram?



- (a) 10 (b) 30 (c) 8 (d) 5

6. How many nails are there in the following diagram?



- (a) 13 (b) 22 (c) 15 (d) 32

7. Add:
$$\begin{array}{r} 9 \\ +7 \\ \hline \end{array}$$

- (a) 26 (b) 2 (c) 16 (d) 17

8. Add:
$$\begin{array}{r} 302 \\ 431 \\ +58 \\ \hline \end{array}$$

- (a) 791 (b) 792 (c) 691 (d) none of these

9. Add:
$$\begin{array}{r} 12,031 \\ 1,224 \\ 8,341 \\ + 489 \\ \hline \end{array}$$

- (a) 22,985 (b) 22,085 (c) 21,085 (d) 22,075

10. Subtract:
$$\begin{array}{r} 98 \\ -27 \\ \hline \end{array}$$

- (a) 61 (b) 81 (c) 125 (d) 71

11. Subtract:
$$\begin{array}{r} 926 \\ -336 \\ \hline \end{array}$$

- (a) 590 (b) 690 (c) 592 (d) 692

12. Subtract:
$$\begin{array}{r} 13,104 \\ - 785 \\ \hline \end{array}$$

- (a) 13,319 (b) 13,621 (c) 12,329 (d) none of these

13. Multiply:
$$\begin{array}{r} 37 \\ \times 8 \\ \hline \end{array}$$

- (a) 276 (b) 296 (c) 306 (d) 302

14. Multiply:
$$\begin{array}{r} 40 \\ \times 29 \\ \hline \end{array}$$

- (a) 1,160 (b) 1,189 (c) 1,260 (d) 1,060

106

TURN PAGE

15. Multiply: $\begin{array}{r} 789 \\ \times 46 \\ \hline \end{array}$

- (a) 35,294 (b) 37,284 (c) 7,830 (d) 36,294

16. Divide:

$$8 \overline{)224}$$

- (a) 30 (b) 26 (c) 28 (d) 27

17. Divide:

$$27 \overline{)3,321}$$

- (a) 13 (b) 132 (c) 1,230 (d) none of these

18. Divide:

$$326 \overline{)44,018}$$

- (a) 135 (c) 105 R=148
(b) 135 R=8 (d) 135 R=80

19. Mr. Jones has 9 acres of farm land. He intends to buy 6 acres in the spring, 15 in the summer and 48 in the fall. How many acres will he have at the beginning of next Winter?

- (a) 30 (b) 68 (c) 58 (d) 78

20. Ms. Smith typed 126 pages on Wednesday. On Thursday she typed 58 pages. How many more pages did Ms. Smith type on Wednesday than on Thursday?
- (a) 68 (b) 184 (c) 78 (d) 168
21. Sixteen ounces of flour were called for in a recipe. If the recipe were doubled, how many ounces of flour would be needed?
- (a) 16 (b) 28 (c) 32 (d) none of these
22. How many 3-foot square sections can be cut from a piece of sheet metal 3-feet wide by 30 feet long?
- (a) 90 (b) 10 (c) 33 (d) 8
23. 64 rounded off to the nearest tens place is:
- (a) 60 (b) 70 (c) 65 (d) 80
24. 1,553 rounded off to the nearest hundreds place is:
- (a) 1,500 (b) 1,550 (c) 1,600 (d) 2,000
25. 23,974 rounded off to the nearest thousands place is:
- (a) 23,900 (b) 23,000 (c) 24,900 (d) 24,000

FRACTIONS

26. $\frac{1}{4}$ is written as:

(a) one-eighth

(c) one-fourteenth

(b) one-fourth

(d) one-fortieth

27. $\frac{7}{3}$ is written as:

(a) three-seventieths

(c) three-sevenths

(b) seventy-thirds

(d) seven-thirds

28. $2\frac{5}{8}$ is written as:

(a) twenty-five eighths

(c) two and five-eighths

(b) two and eight-fifths

(d) twenty-eight fifths

29. Four-fifths is written as:

(a) $\frac{4}{5}$

(b) $\frac{4}{50}$

(c) $\frac{5}{4}$

(d) none of these

30. Nine-sixths is written as:

(a) $\frac{6}{9}$

(b) $\frac{9}{6}$

(c) $\frac{90}{6}$

(d) $\frac{96}{6}$

31. Four and eleven-eighteenths is written as:

(a) $\frac{411}{18}$

(b) $\frac{4}{1118}$

(c) $4\frac{11}{18}$

(d) $4\frac{11}{8}$

32. Add:

$$\begin{array}{r} \frac{5}{8} \\ + \frac{2}{8} \\ \hline \end{array}$$

(a) $\frac{3}{8}$

(b) $\frac{5}{8}$

(c) $\frac{7}{8}$

(d) $\frac{7}{16}$

33. Add:

$$\begin{array}{r} \frac{4}{6} \\ + \frac{2}{6} \\ \hline \end{array}$$

(a) $\frac{1}{3}$

(b) $\frac{1}{2}$

(c) 6

(d) 1

34. Add:

$$\begin{array}{r} \frac{3}{4} \\ + \frac{1}{8} \\ \hline \end{array}$$

(a) $\frac{7}{8}$

(b) $\frac{1}{2}$

(c) $\frac{3}{8}$

(d) $\frac{1}{3}$

35. Add:

$$\begin{array}{r} \frac{1}{15} \\ + \frac{5}{6} \\ \hline \end{array}$$

(a) $\frac{7}{10}$

(b) $\frac{29}{30}$

(c) $\frac{23}{30}$

(d) none of these

36. Add:

$$\begin{array}{r} \frac{9}{10} \\ + \frac{7}{25} \\ \hline \end{array}$$

(a) $\frac{19}{50}$

(b) $1\frac{9}{50}$

(c) $\frac{9}{50}$

(d) $\frac{16}{35}$

37. Add:

$$\begin{array}{r} 12\frac{7}{8} \\ + 5\frac{1}{6} \\ \hline \end{array}$$

(a) $17\frac{3}{24}$

(b) $17\frac{1}{24}$

(c) $18\frac{1}{24}$

(d) $17\frac{5}{24}$

38. Subtract:

$$\begin{array}{r} \frac{8}{9} \\ - \frac{3}{9} \\ \hline \end{array}$$

(a) 5

(b) $\frac{11}{9}$

(c) $\frac{4}{9}$

(d) $\frac{5}{9}$

39. Subtract:

$$\begin{array}{r} \frac{5}{6} \\ - \frac{3}{6} \\ \hline \end{array}$$

(a) 2

(b) $\frac{1}{3}$

(c) $\frac{11}{6}$

(d) $\frac{1}{6}$

40.

Subtract:

$$\begin{array}{r} \frac{8}{9} \\ - \frac{2}{3} \\ \hline \end{array}$$

(a) $\frac{4}{9}$

(b) $\frac{1}{3}$

(c) $\frac{2}{9}$

(d) 6

41.

Subtract:

$$\begin{array}{r} 10\frac{1}{12} \\ - 4 \\ \hline \end{array}$$

(a) $5\frac{11}{12}$

(b) 6

(c) $5\frac{1}{2}$

(d) $6\frac{1}{12}$

42.

Subtract:

$$\begin{array}{r} 16\frac{7}{10} \\ - 12\frac{2}{9} \\ \hline \end{array}$$

(a) $4\frac{1}{2}$

(b) $4\frac{43}{90}$

(c) $4\frac{44}{90}$

(d) none of these

43.

Subtract:

$$\begin{array}{r} 34\frac{1}{10} \\ - 12\frac{4}{15} \\ \hline \end{array}$$

(a) $21\frac{5}{6}$

(b) $20\frac{5}{6}$

(c) $20\frac{1}{6}$

(d) $21\frac{1}{6}$

44.

Multiply: $\frac{1}{4} \times \frac{1}{8}$

(a) $\frac{1}{22}$

(b) $\frac{1}{12}$

(c) $\frac{1}{32}$

(d) $1\frac{1}{2}$

45. Multiply: $\frac{2}{5} \times \frac{4}{7}$

(a) $\frac{1}{2}$

(b) $\frac{6}{35}$

(c) $\frac{6}{7}$

(d) $\frac{8}{35}$

46. Multiply: $\frac{5}{21} \times \frac{3}{35}$

(a) $\frac{1}{7}$

(b) $\frac{8}{56}$

(c) $\frac{1}{49}$

(d) none of these

47. Multiply: $8 \frac{1}{6} \times 4 \frac{2}{7}$

(a) $32 \frac{1}{21}$

(b) 35

(c) $5 \frac{5}{6}$

(d) $4 \frac{2}{7}$

48. Multiply: $\frac{3}{4} \times \frac{4}{9} \times \frac{6}{7}$

(a) $\frac{2}{7}$

(b) $\frac{13}{20}$

(c) $\frac{3}{14}$

(d) $\frac{1}{14}$

49. Multiply: $\begin{array}{r} 48 \\ \times 3 \frac{3}{4} \\ \hline \end{array}$

(a) $1,443 \frac{3}{4}$

(b) 144

(c) 180

(d) $144 \frac{3}{4}$

50. Divide: $\frac{5}{8} \div \frac{1}{4}$

(a) $\frac{2}{5}$

(b) $2 \frac{1}{2}$

(c) $\frac{5}{32}$

(d) $5 \frac{3}{5}$

51. Divide: $\frac{3}{5} \div \frac{1}{10}$

(a) 6 (b) $\frac{3}{50}$ (c) $\frac{1}{3}$ (d) none of these

52. Divide: $\frac{5}{6} \div 2$

(a) $1 \frac{2}{3}$ (b) $\frac{3}{5}$ (c) $2 \frac{5}{6}$ (d) $\frac{5}{12}$

53. Divide: $3 \frac{1}{3} \div 2 \frac{1}{2}$

(a) $8 \frac{1}{3}$ (b) $1 \frac{1}{3}$ (c) $6 \frac{1}{6}$ (d) $5 \frac{2}{5}$

54. Divide: $\frac{\frac{3}{10}}{\frac{9}{10}}$

(a) $\frac{1}{9}$ (b) 9 (c) $\frac{9}{100}$ (d) $\frac{1}{3}$

55. Divide: $5 \frac{1}{7} \div 2 \frac{1}{4}$

(a) $2 \frac{2}{7}$ (b) $11 \frac{4}{7}$ (c) $10 \frac{4}{7}$ (d) $7 \frac{11}{28}$

56. A farmer removed $\frac{1}{2}$ of all the corn in a silo and a week later removed $\frac{1}{4}$ of the original amount of corn. What fractional part of the corn was removed from the silo?

(a) $\frac{1}{8}$ (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

57. A secretary typed an entire report on $5\frac{3}{4}$ pages. However, he/she was supposed to type the report on no more than $4\frac{1}{2}$ pages. How many extra pages did the secretary type?

(a) $2\frac{1}{2}$ (b) .1 (c) $10\frac{1}{4}$ (d) $1\frac{1}{4}$

58. A dress needing repair was sewn $\frac{3}{4}$ " up a seam. However, the repair should have been made 3 times that length. How many inches should the repair have been made?

(a) $2\frac{1}{4}$ (b) $\frac{1}{4}$ (c) 2 (d) 4

59. A worker has two pieces of sheet metal. How many quarters will he/she have if each piece is cut into equal sizes?

(a) 2 (b) 4 (c) 8 (d) 12

TURN PAGE

DECIMALS

60. .26 is written as:

- (a) twenty-six tenths
- (b) twenty-six hundredths
- (c) twenty-six thousandths
- (d) twenty-six

61. .0048 is written as:

- (a) forty-eight thousandths
- (b) forty-eight hundredths
- (c) forty-eight ten thousandths
- (d) four hundred and eighty

62. Seven-tenths is represented by which number?

- (a) .7
- (b) .07
- (c) .007
- (d) 7

63. Ten ten thousandths is represented by which number?

- (a) 10,000
- (b) .010
- (c) .0001
- (d) .0010

TURN PAGE

64. Add: $\begin{array}{r} .2 \\ .3 \\ +.4 \\ \hline \end{array}$

- (a) .09 (b) .9 (c) 9 (d) .009

65. Add: $\begin{array}{r} .4 \\ .6 \\ +.9 \\ \hline \end{array}$

- (a) 1.9 (b) 19 (c) .19 (d) .019

66. Add: $\begin{array}{r} 8.7 \\ 5.2 \\ +2.4 \\ \hline \end{array}$

- (a) 15.13 (b) .163 (c) 1.63 (d) none of these

67. Add: $24 + 3.5 + .28$

- (a) 27.78 (b) 24.378 (c) 28 (d) 2.778

68. Add: $136.2 + 4.362 + 1.4 + .054$

- (a) 142.1016 (c) 142.016
(b) .00142016 (d) 136.8302

124

69. Add: $.00826 + .001931$

(a) $.0010191$

(c) $.02757$

(b) $.010191$

(d) $.002757$

70. Subtract: $\begin{array}{r} .8 \\ -.3 \end{array}$

(a) $.5$

(b) $.05$

(c) 5

(d) $.24$

71. Subtract: $\begin{array}{r} 9.2 \\ -6.4 \end{array}$

(a) 3.8

(b) 38

(c) 2.8

(d) $.28$

72. Subtract: $\begin{array}{r} 45.032 \\ -7.63 \end{array}$

(a) 38.662

(b) 37.662

(c) 38.402

(d) 37.402

73. Subtract: $26 - 4.82$

(a) 22.18

(b) 21.18

(c) 21.82

(d) none of these

74. Subtract: $498.3 - 4.983$

(a) 0

(b) 492.317

(c) 493.317

(d) 493.1283

75. Subtract: $252 - .004$

- (a) 248 (b) 242.006 (c) 252.004 (d) 251.996

76. Multiply: $\begin{array}{r} .8 \\ \times 3 \\ \hline \end{array}$

- (a) 2.4 (b) .24 (c) 24 (d) .024

77. Multiply: $\begin{array}{r} 34.5 \\ \times .26 \\ \hline \end{array}$

- (a) .897 (b) 897 (c) 89.7 (d) 8.97

78. Multiply: $\begin{array}{r} 100 \\ \times .432 \\ \hline \end{array}$

- (a) .432 (b) 43.2 (c) 4.32 (d) .00432

79. Multiply: $.25 \times .25$

- (a) .0625 (b) .625 (c) 6.25 (d) none of these.

80. Multiply: 18.2×3.64

- (a) 662.48 (b) 6624.8 (c) 66.248 (d) .66248

81. Multiply: 1500×6.75

- (a) 101.25 (b) .10125 (c) 10.125 (d) 10,125

82. Divide: $14/\overline{7.28}$

(a) 5.2

(b) 52

(c) .52

(d) .052

83. Divide: $4/\overline{.0024}$

(a) 6

(b) .006

(c) .6

(d) .0006

84. Divide: $6/\overline{3}$

(a) .5

(b) 50

(c) .05

(d) 5

85. Divide: $.25/\overline{1.6125}$

(a) 645

(b) 6.45

(c) .0645

(d) .00645

86. Divide: $86.8/\overline{140.616}$

(a) 1.62

(b) .162

(c) 16.2

(d) none of these

87. Divide: $.022 \div 4$

(a) .5

(b) .005

(c) .0055

(d) .05

88. Joe removed .5 of all the flowers from a box and Cindy removed .3 of the original number of flowers. What decimal part of the flowers was removed from the box?

(a) .2 (b) 8 (c) .8 (d) .08

89. Mr. Best sold .24 of the suits he wanted to sell at his clothing store one day. What decimal part of his suits still need to be sold?

(a) 76 (b) .76 (c) 7.6 (d) 24

90. A patient needs to take 2.75 ounces of medicine per day. After 5 days, how many ounces of medicine will the patient have taken?

(a) 13.75 (b) 1.375 (c) .1375 (d) 137.5

91. A carpenter has 1 board of lumber. If he/she cuts the board into 10 equal pieces, what decimal part would one piece be?

(a) .01 (b) 10 (c) 1 (d) .1

92. Add:
- | |
|----------------|
| \$14.26 |
| \$ 3.31 |
| \$.98 |
| <u>+\$.07</u> |

(a) \$7.62 (b) \$8.62 (c) \$17.62 (d) \$18.62

93. Celery seeds cost \$.59 per pack, lettuce seeds cost \$.54 per pack, and carrot seeds cost \$.48 per pack. What is the cost if one of each pack of seeds is bought?

(a) \$1.61 (b) \$16.10 (c) \$.16 (d) \$2.61

94. Subtract: $\begin{array}{r} \$24.31 \\ -\$5.42 \\ \hline \end{array}$

- (a) \$29.73 (b) \$18.89 (c) \$28.89 (d) \$19.73

95. Mrs. Perez paid for \$15.26 worth of groceries with a twenty dollar bill. How much change should she receive?

- (a) \$5.74 (b) \$5.84 (c) \$4.74 (d) \$4.84

96. Multiply: $\begin{array}{r} \$24.99 \\ \times 3 \\ \hline \end{array}$

- (a) \$74.97 (b) \$749.07 (c) \$.74 (d) \$7.49

97. If paint costs \$12.49 per gallon, how much would fourteen gallons cost?

- (a) \$124.90 (b) \$17.48 (c) \$49.96 (d) \$174.86

98. Divide: $25/\$2.00$

- (a) \$80 (b) \$8 (c) \$.08 (d) \$.80

99. Ten pounds of nails cost \$12.40. How much would one pound cost?

- (a) \$1.24 (b) \$.12 (c) \$.24 (d) \$22.40

100. .84 rounded off to the nearest tenths place is:

- (a) .8 (b) .9 (c) .85 (d) .83

101. .9829 rounded off to the nearest thousandths place is:

- (a) .982 (b) .983 (c) .9820 (d) .98

102. .00175 rounded off to the nearest ten thousandths place is:

- (a) .0017 (b) .0020 (c) .00176 (d) .0018

TURN PAGE

PERCENT

103. 48% is written as:

- (a) forty percent
- (b) four hundred eighty percent
- (c) forty-eight percent
- (d) eighty-four percent

104. 125.5% is written as:

- (a) one hundred twenty-five and five-tenths percent
- (b) one thousand two hundred fifty-five percent
- (c) twenty-five and five-tenths percent
- (d) one hundred twenty-five percent

105. $9\frac{3}{4}\%$ is written as:

- (a) ninety-three fourths percent
- (b) nine and three-fourths percent
- (c) nine and four-thirds percent
- (d) ninety-four thirds percent

TURN PAGE

106. Seventy-five percent is represented by which of the following?

- (a) 70% (b) 75% (c) 85% (d) 57%

107. Six and nine-tenths percent is represented by which of the following?

- (a) $\frac{69}{10}\%$ (b) 6910% (c) 6.9% (d) none of these

108. One hundred fifty-six and one-half percent is represented by which of the following?

- (a) $156\frac{1}{2}\%$ (b) 156.1% (c) 156% (d) $10056\frac{1}{2}\%$

109. 8 is what percent of 32?

- (a) 33% (b) 25% (c) 50% (d) 75%

110. 75% of 48 is:

- (a) 12 (b) 24 (c) 36 (d) 48

111. 40 is 20% of what number?

- (a) 60 (b) 100 (c) 20 (d) none of these

MIXED OPERATIONS

112. $\frac{4}{5}$ changed to a decimal is:

- (a) 4% (b) $\frac{1}{5}$ (c) .75 (d) .80

113. 30% changed to a fraction is:

- (a) $\frac{3}{100}$ (b) $\frac{3}{10}$ (c) $\frac{1}{30}$ (d) .03

114. $\frac{5}{8}$ changed to a percent is:

- (a) $62\frac{1}{2}\%$ (b) 625% (c) $6.2\frac{1}{2}\%$ (d) none of these

115. 92% changed to a decimal is:

- (a) .092 (b) 92 (c) 9.2 (d) .92

116. .023 changed to a percent is:

- (a) 23% (b) 23 (c) 2.3% (d) .23%

117. $\frac{1}{2}$ changed to a decimal is:

- (a) .50 (b) .05 (c) 50 (d) .2

118. $6\frac{3}{5}$ changed to a decimal is:

- (a) .066 (b) 66 (c) .66 (d) none of these

119. .75 changed to a fraction is:

- (a) $\frac{1}{4}$ (b) .50 (c) $\frac{3}{4}$ (d) $\frac{5}{7}$

120. 2.45 changed to a fraction is:

- (a) $\frac{1}{245}$ (b) $2\frac{4}{5}$ (c) $2\frac{9}{20}$ (d) 24.5%

121. A machine produces 150 items per hour. If one morning run of four hours gave 24 defective items, what percent of items produced were defective?

- (a) 4% (b) 16% (c) 6.25% (d) 2%

122. A farmer harvested 100 bushels of corn on Monday, 85 bushels on Tuesday, and 40 bushels on Wednesday. If he/she wants to harvest 300 bushels of corn by Thursday, what part of the corn still needs to be harvested?

- (a) .75 (b) .25 (c) .50 (d) .10

123. If 1,000 bricks are needed to build a wall and only 650 are on the work site, what part of the bricks needed are available?

- (a) $\frac{7}{10}$ (b) $\frac{13}{10}$ (c) $\frac{13}{20}$ (d) $\frac{7}{20}$

124. Find the average (mean) of the following numbers: 55, 31, 26, 48

- (a) 35 (b) 160 (c) 40 (d) 80

125. Find the average (mean) of the following numbers: 12.1, 8.9, 16.5

- (a) 12.5 (b) 13.5 (c) 11.5 (d) 14

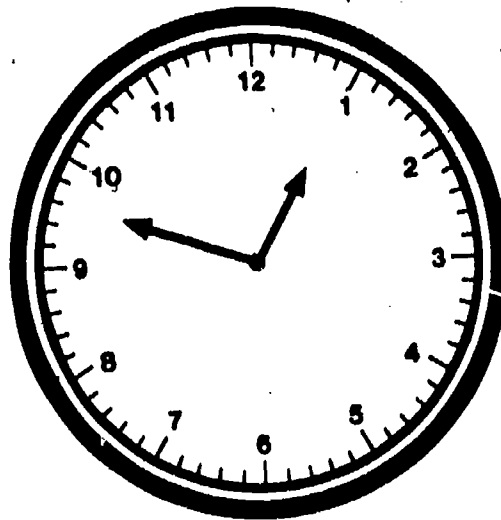
126. A salesperson sold \$80.50 of clothing on Monday, \$100.27 on Tuesday, \$93.76 on Wednesday, \$85.24 on Thursday, and \$125.08 on Friday. What was his/her average sales per day?

- (a) \$76.97 (b) \$96.97 (c) \$116.97 (d) \$93.76

TURN PAGE

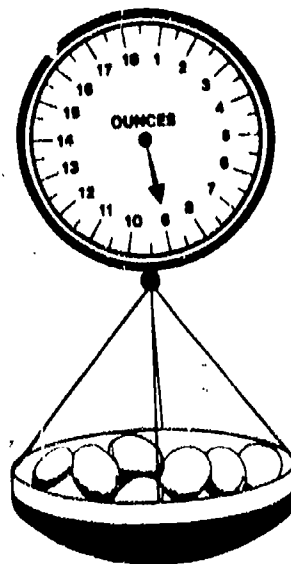
MEASUREMENT AND CALCULATION

127. What time is shown on the clock?



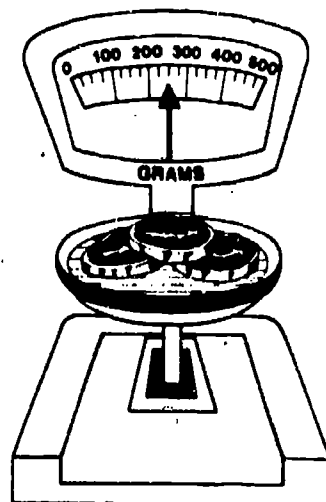
- (a) 12:50 (b) 12:52 (c) 12:48 (d) 12:43

128. How much do the vegetables weigh?



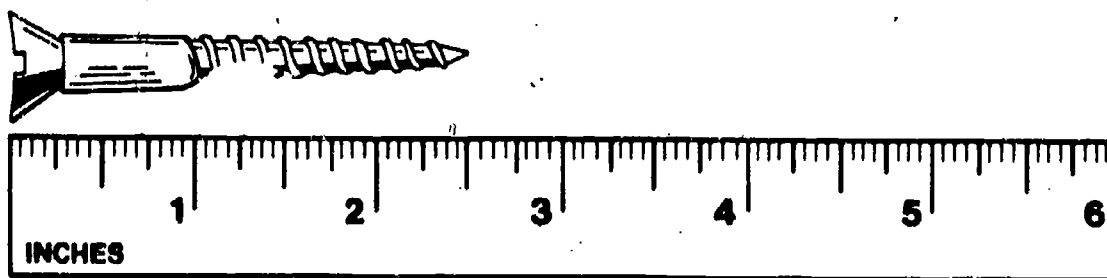
- (a) 9 ounces (b) 8 ounces (c) 10 ounces (d) 11 ounces

129. How much does the meat weigh?



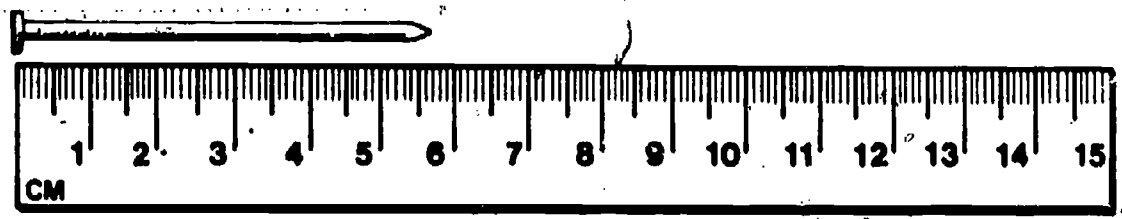
- (a) 200 grams (b) 300 grams (c) 225 grams (d) 250 grams

130. What is the length of the screw to the nearest quarter inch?



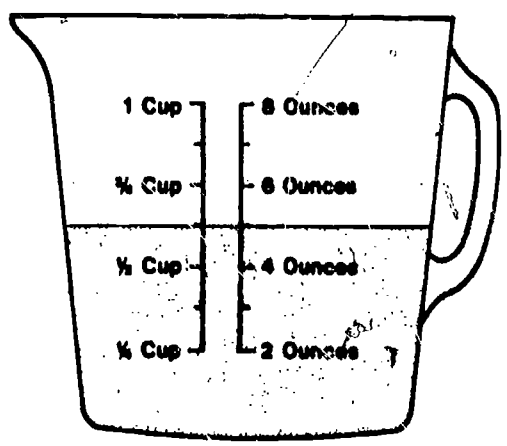
- (a) 2" (b) $2\frac{1}{2}$ " (c) $2\frac{3}{4}$ " (d) 3"

131. How long is the nail to the nearest tenth of a centimeter?



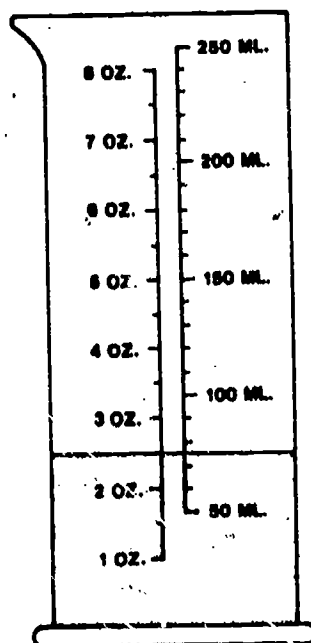
- (a) 5.5 centimeters
- (b) 5 centimeters
- (c) 5.7 centimeters
- (d) 6 centimeters

132. What is the volume of milk?



- (a) 2 ounces
- (b) 3 ounces
- (c) 4 ounces
- (d) 5 ounces

133. What is the volume of water?



- (a) 50 ml. (b) 75 ml. (c) 100 ml. (d) 200 ml.

134. .25 kilograms are equal to:

- (a) $\frac{1}{250}$ gram (c) 2,500 grams
(b) 25 grams (d) 250 grams

135. 11 pounds are equal to:

- (a) 5 kilograms (c) 50 grams
(b) 50 kilograms (d) 500 grams

136. 10 centimeters are equal to:

- (a) 1 meter (b) .1 meter (c) .01 meter (d) none of these

137. 5 inches are equal to:

- (a) 127 millimeters (c) 10 millimeters
(b) .127 millimeters (d) 127 centimeters

138. 2 liters are equal to:

- (a) 2 milliliters (c) 2,000 milliliters
(b) 20 milliliters (d) 200 milliliters

139. 1.06 quarts are equal to:

- (a) 4 milliliters (c) 1 milliliter
(b) 4 liters (d) 1 liter

140. A farmer began plowing a field at 5:35 a.m. He/she finished 13 hours and 8 minutes later. What time was it when the farmer finished plowing the field?

- (a) 6:35 p.m. (c) 5:35 p.m.
(b) 6:43 p.m. (d) 6:35 a.m.

141. A customer bought 10 pounds of pork chops, 6 pounds 8 ounces of steak, 1 pound of bacon, and 4 pounds 15 ounces of chicken. How much meat did the customer buy?

(a) 21 pounds 7 ounces

(c) 44 pounds

(b) 23 pounds

(d) none of these

142. A patient weighs 100 kilograms, but needs to lose 25 kilograms. How much will the patient weigh when he/she loses the necessary weight?

(a) 125 kilograms

(c) 125 pounds

(b) 75 kilograms

(d) 100 kilograms

143. If one wall stud is 8 feet long and there are 12 studs in a wall, how many linear feet of lumber (assuming zero waste) will a carpenter need for all the studs in the wall?

(a) 20 feet

(b) 56 feet

(c) 96 feet

(d) 106 feet

144. A piece of pipe is 12 meters long. If the pipe is cut into 4 equal pieces, what would be the length of each piece (assuming zero waste)?

(a) 8 meters

(c) 16 meters

(b) 3 meters

(d) none of these

145. A cook needs ten 8-ounce cartons of milk for a recipe. How many quarts of milk would be used?

(a) 80 quarts

(c) 5 quarts

(b) 10 quarts

(d) 2.5 quarts

146. After a car traveled 260 miles its tank was refilled with 10.4 liters of gasoline. How many miles per liter did the car get?

(a) 25

(b) 20

(c) 30

(d) 27

TURN PAGE

ESTIMATION

147. A secretary organized his/her work and determined that it will take 25 minutes to type letters, 2 hours to type a mailing list, 45 minutes to proofread a manuscript, and 1 1/2 hours to do file work. While none of the following answers is correct, which answer is a reasonable estimate of the time it will take to do the work?
- (a) about 3 hours (c) about 8 hours
(b) about $6\frac{1}{2}$ hours (d) about 4 hours 45 minutes
148. A welder has 1 1/2 feet of welding rod but he/she needs 3 times that amount to complete a job. While none of the following answers is correct, which answer is a reasonable estimate of the amount of welding rod needed to complete the job?
- (a) about 3 feet (c) about 7 feet
(b) about $4\frac{3}{4}$ feet (d) about 10 feet
149. On a given day a machine shop earns \$480 and pays \$183.50 in overhead costs. While none of the following answers is correct, which answer is a reasonable estimate of the profit made by the machine shop?
- (a) about \$250.50 (c) about \$290.00
(b) about \$663.50 (d) about \$350.00

TURN PAGE

150. A child drank 451 milliliters of milk on Monday, 675 milliliters on Tuesday, and 524 milliliters on Wednesday. While none of the following answers is correct, which answer is a reasonable estimate of the average (mean) amount of milk the child drank per day?

(a) about 545 milliliters

(c) about 483 milliliters

(b) about 650 milliliters

(d) about 800 milliliters

STOP, YOU ARE FINISHED

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT PERFORMANCE TEST SKILL PROFILE

<u>Scales/Skills</u>	<u>Item Number</u>	<u>Number Correct</u>
WHOLE NUMBERS		
read, write, and count	1 to 6	_____
add and subtract	7 to 12	_____
multiply and divide	13 to 18	_____
solve word problems	19 to 22	_____
round off	23 to 25	_____
	Total	_____
FRACTIONS		
read and write	26 to 31	_____
add and subtract	32 to 43	_____
multiply and divide	44 to 55	_____
solve word problems	56 to 59	_____
	Total	_____
DECIMALS		
read and write	60 to 63	_____
add and subtract	64 to 75	_____
multiply and divide	76 to 87	_____
solve word problems	88 to 91	_____
solve dollars and cents problems	92 to 99	_____
round off	100 to 102	_____
	Total	_____
PERCENT		
read and write	103 to 108	_____
solve problems	109 to 111	_____
	Total	_____
MIXED OPERATIONS		
fractions to decimals to percents, mixed numbers, and decimal fractions	112 to 120	_____
solve word problems	121 to 123	_____
find averages	124 to 126	_____
	Total	_____
MEASUREMENT AND CALCULATION		
read time, weight, distance, and volume scales	127 to 133	_____
do metric weight, distance, and volume conversions	134 to 139	_____
solve time, weight, distance, and volume word problems	140 to 146	_____
	Total	_____
ESTIMATION		
determine if a solution or answer to a mathematics problem is reasonable	147 to 150	_____
	Total	_____
	TOTAL Score	_____
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Appendix F

Performance Test Answer Key

Performance Test Answer Key

1) c	28) c	55) a	82) c	109) b	136) b
2) a	29) a	56) b	83) d	110) c	137) a
3) a	30) b	57) d	84) a	111) d	138) c
4) d	31) c	58) a	85) b	112) d	139) d
5) a	32) c	59) c	86) a	113) b	140) b
6) b	33) d	60) b	87) c	114) a	141) d
7) c	34) a	61) c	88) c	115) d	142) b
8) a	35) d	62) a	89) b	116) c	143) c
9) b	36) b	63) d	90) a	117) a	144) b
10) d	37) c	64) b	91) d	118) d	145) d
11) a	38) d	65) a	92) d	119) c	146) a
12) d	39) b	66) d	93) a	120) c	147) d
13) b	40) c	67) a	94) b	121) a	148) b
14) a	41) d	68) c	95) c	122) b	149) c
15) d	42) b	69) b	96) a	123) c	150) a
16) c	43) a	70) a	97) d	124) c	
17) d	44) c	71) c	98) c	125) a	
18) b	45) d	72) d	99) a	126) b	
19) d	46) c	73) b	100) a	127) c	
20) a	47) b	74) c	101) b	128) a	
21) c	48) a	75) d	102) d	129) d	
22) b	49) c	76) a	103) c	130) b	
23) a	50) b	77) d	104) a	131) c	
24) c	51) a	78) b	105) b	132) d	
25) d	52) d	79) a	106) b	133) b	
26) b	53) b	80) c	107) c	134) d	
27) d	54) d	81) d	108) a	135) a	

Appendix G

Assessment of Untested Skills

There are four generalizable mathematics skills which are assessed using the Student Self-Ratings and Teacher Ratings but not assessed using the Performance Test. These skills include: (a) Mixed Operations, Skill #20-Perform written calculations quickly, (b) Measurement and Calculation, Skill #23-Use a measuring device to determine an object's weight, distance, or volume in standard (English) units, (c) Measurement and Calculation, Skill #24-Use a measuring device to determine an object's weight, distance, or volume in Metric units, and (d) Measurement and Calculation, Skill #27-Use a calculator to perform basic arithmetic operations to solve problems. These four skills are not assessed using the Performance Test because they are more appropriately assessed using actual "hands-on" procedures by using equipment, such as, measuring devices and calculators. When assessing these skills, teachers should use equipment and materials used in their courses or programs.